CATALOG 1978-1979

NAVAL POSTGRADUATE SCHOOL
EXCELLENCE THROUGH EDUCATION

NAVAL POSTGRADUATE SCHOOL, MONTEREY, CALIFORNIA

MISSION

To conduct and direct the advanced education of commissioned officers, and to provide such other technical and professional instruction as may be prescribed to meet the needs of the naval service; and in support of the foregoing, to foster and encourage a program of research in order to sustain academic excellence.

CALENDAR FOR 1978-79 ACADEMIC YEAR

1978

Refresher Course begins	Monday, 14 August
Labor Day (holiday)	Monday, 4 September
Registration	Monday, 25 September
Examination Week for Summer Quarter	25-28 September
Summer Quarter ends	Thursday, 28 September
Graduation	Friday, 29 September
Fall Quarter begins	Monday, 2 October
Columbus Day (holiday)	Monday, 9 October
Veterans Day (holiday)	Friday, 10 November
Thanksgiving Day (holiday)	Thursday, 23 November
Examination Week for Fall Quarter	15-19 December
Fall Quarter ends	Tuesday, 19 December
Graduation	Tuesday, 19 December

JANUARY

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1979

Registration	Tuesday, 2 January
Winter Quarter begins	Monday, 8 January
Refresher Course begins	Monday, 12 February
Washington's Birthday (holiday)	Monday, 19 February
Registration	Monday, 26 March
Examination Week for Winter Quarter	26-29 March
Winter Quarter ends	Friday, 30 March
Graduation	Friday, 30 March
Spring Quarter begins	Monday, 2 April
Memorial Day (holiday)	Monday, 28 May
Examination Week for Spring Quarter	18-21 June
Spring Quarter ends	Friday, 22 June
Graduation	Friday, 22 June
Registration	Monday, 2 July
Fourth of July (holiday)	Wednesday, 4 July
Summer Quarter begins	Monday, 9 July
Refresher Course begins	Monday, 13 August
Labor Day (holiday)	Monday, 3 September
Registration	Monday, 24 September
Examination Week for Summer Quarter	24-27 September
Summer Quarter ends	Friday, 28 September
Graduation	Friday, 28 September
Fall Quarter begins	Monday, 1 October
Columbus Day (holiday)	Monday, 8 October
Veterans Day (holiday)	Monday, 12 November
Thanksgiving Day (holiday)	Thursday, 22 November
Examination Week for Fall Quarter	15-19 December
Fall Quarter ends	Wednesday, 19 December
Graduation	Wednesday, 19 December
Registration	Monday, 31 December
Winter Quarter begins	Monday, 7 January 1980

JANUARY

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Superintendent

TYLER FREELAND DEDMAN
B.S., U. S. Naval Academy, 1947
M.S. in Engineering, Princeton University, 1957

Academic Dean

JACK RAYMOND BORSTING
B.A., Oregon State University, 1951;
M.A., University of Oregon, 1952; Ph.D., 1959

BOARD OF ADVISORS

The NPS Board of Advisors is a distinguished group of civilian educators, business and professional men. The Board visits the campus periodically to examine educational programs, recommend improvements and discuss plans and problems with the Superintendent. Present members are:

Rear Admiral William A. Brockett, USN (Ret), Past President, Webb Institute of Naval Architecture

Dr. Kermit O. Hanson, Dean, School and Graduate School of Business Administration, University of Washington

Dr. Gerald J. Lieberman, Vice Provost and Dean of Research, Stanford University

Dr. Hans M. Mark, Under Secretary of the Air Force

Admiral Frederick H. Michaelis, USN, Chief of Naval Material, Navy Department

Dr. Russell R. O'Neill, Dean, School of Engineering and Applied Sciences, University of California, Los Angeles

Dr. David S. Potter, Vice President, Environmental Activities Staff, General Motors Corporation

Admiral James S. Russell, USN (Ret) (Board of Chairman), Consultant, Boeing Aircraft

The Honorable Bob Wilson, House of Representatives, Washington, DC

SUPERINTENDENT'S STAFF

DIRECTOR OF PROGRAMS, JOSEPH MICHAEL BARRON, Captain, U.S. Navy; B.S., Naval Postgraduate School, 1962; M.S., George Washington Univ., 1972.

DIRECTOR OF MILITARY OPERATIONS AND LOGISTICS, DEMPSEY BUTLER, JR., Captain, U.S. Navy; B.S., U.S. Naval Academy, 1949; B.S., Naval Postgraduate School, 1963; M.S. in Aeroelectronics, 1964.

DEAN OF EDUCATIONAL DEVELOPMENT and EXECUTIVE DIRECTOR, OFFICE OF CONTINUING EDUCATION, WALTER MAX WOODS: B.S., Kansas State Teachers College, 1951; M.S., Univ. of Oregon, 1957; Ph.D., Stanford Univ., 1961.

DEAN OF RESEARCH AND DEAN OF SCIENCE AND ENGINEERING, WILLIAM MARSHALL TOLLES; B.A., Univ. of Connecticut, 1958; Ph.D., Univ. of California at Berkeley, 1962.

DEAN OF ACADEMIC PLANNING and DEAN OF INFORMATION AND POLICY SCIENCES, DAVID ALAN SCHRADY: B.S., Case Institute of Technology, 1961; M.S., 1963; Ph.D., 1965.

DEAN OF ACADEMIC ADMINISTRATION, ARABHAM SHEINGOLD; B.S., College of the City of New York, 1936; M.S., 1937.

REGISTRAR, EDITH JEAN WARRINER; B.A., Occidental College, 1947.

HISTORY

The Naval Postgraduate School is in its 70th year of operation. The development of a naval institution of higher learning dedicated to the advanced education of commissioned officers began on 9 June 1909 when the Postgraduate Department of the U. S. Naval Academy was established at Annapolis. Ten officers made up the first class, three professors formed the faculty, and marine engineering was the one course of study.

The School closed during World War I, but classes resumed in 1919. In ensuing years, the School grew in size and scope as its educational offerings were more comprehensively directed towards the broad military applications of science and technology. The postgraduate department was renamed the United States Naval Postgraduate School, but still operated as a part of the Naval Academy. In 1927, the General Line Course was established to acquaint junior line officers with modern developments within the Navy and to broaden their professional knowledge of future command at sea.

With the advent of World War II, the School's activities increased substantially. There was a large growth in student enrollment and educational programs were expanded to meet the evolving needs of the Navy. Following the end of the War, plans were initiated to move the School to more suitable facilities and to enhance its academic status.

Between 1945 and 1948, Congress established the School as a separate activity under its own Superintendent, created the office of Academic Dean and granted the Superintendent the authority to award the bachelor's, master's and doctor's degrees. It also approved Monterey as the future home of the School. The General Line School, closed during the war years, was re-established at Monterey and at Newport, Rhode Island.

After purchasing the former Del Monte Hotel and surrounding acreage, the Navy officially established the School on the West Coast on 22 December 1951. With its enlarged facilities, the School continued to grow in curricular programs and in student enrollment. In 1956, the Navy Management School was formed as a component of the Postgraduate School to provide graduate education in the theory and application of scientific methods of management. In 1958, the General Line School was renamed the General Line and Naval Science School, and a Bachelor of Science curriculum was offered to selected officers who had not completed their undergraduate education. A further need for baccalaureate courses resulted in the inauguration of the Bachelor of Arts curriculum in 1961.

A major internal reorganization of the School was authorized in 1962. The Management, Engineering, and General Line School merged, making the Naval Postgraduate School, in effect, a naval university, unified in policies, procedures and objectives.

In 1973, the Naval Postgraduate School, together with the Naval War College and the U. S. Naval Academy, was made a component of the Naval Education and Training Command located at Pensacola, Florida.

Since 1946, the School has awarded 6,047 bachelor's degrees, 8,229 master's degrees, 255 engineer's degrees, and 91 doctorate degrees. At the present time, the total educational emphasis is on graduate-level programs.

Currently, the Naval Postgraduate School occupies a multi-million dollar campus, graduates an average of 800 students a year and offers a range of curricular programs specifically tailored to impart the scientific, engineering, operational and administrative knowledge required to meet the present and projected professional needs of the Department of Defense. Its student body includes officers of all five U. S. services and 25 allied services. Also, since 1975, it has enrolled civilian employees of the U. S. Government.

ORGANIZATION AND FUNCTIONS

The Superintendent of the Postgraduate School is a rear admiral of the line of the Navy. His principal assistants are a Provost/Academic Dean who is the senior member of the civilian faculty; and two captains of the line — a Director of Programs, and a Director of Military Operations and Logistics.

The academic programs and direct supporting functions are administered and operated through a unique organization composed of Curricular Offices and Academic Departments. The former are staffed by naval officers and civilian faculty members whose primary functions are threefold: (1) academic counseling and military supervision of officer students; (2) curriculum development and management to insure attainment of professional and academic objectives; and (3) liaison with curricular sponsor representatives. Officer students in each curricula group pursue similar or closely related curricula. Officer students are grouped into the following curricular program areas:

Administrative Science
Aeronautical Engineering
Command, Control and Communications (C3)
Computer Technology
Electronics and Communications
Environmental Sciences
Naval Engineering
Naval Intelligence/National Security Affairs
Operations Research/Systems Analysis
Weapons Engineering/ASW

The teaching functions of classroom and laboratory instruction and thesis supervision are accomplished by a faculty which is organized into eleven academic departments and three interdisciplinary groups:

Administrative Sciences
Aeronautics
ASW Group
Command, Control and Communications (C3) Group
Computer Science
Electrical Engineering
Electronic Warfare Group
Mathematics
Mechanical Engineering
Meteorology
National Security Affairs
Oceanography
Operations Research
Physics and Chemistry

Over five-sixths of the teaching staff are civilians of varying professional rank and the remainder military officers.

The Academic Program organization described is supervised by the Director of Programs, the Dean of Information and Policy Sciences, and the Dean of Science and Engineering who collaborate to share jointly the responsibilities for planning, conduct and administration of the several educational programs.

The close tie between elements of this dual organization is further typified by the role of the Academic Associates. These are individual civilian faculty members appointed by the Academic Dean to work closely with the Curricular Officers in the development and continuing monitoring of curricula — the Navy's needs being the responsibility of the Curricular Officer, and academic soundness being the responsibility of the Academic Associate.

Logistic service support is rendered by conventional departments such as Supply and Public Works grouped organizationally under a Director of Military Operations and Logistics. Certain other officers such as the Comptroller and Civilian Personnel Officer are directly responsible to the Superintendent in a slightly modified but typical naval staff organization.

FACILITIES

The Naval Postgraduate School is located within the City of Monterey, and only a mile east of the downtown business area and the city's Fishermen's Wharf. The site of the School is the former luxury Del Monte Hotel of pre-World War II days. The beautifully landscaped campus contains most of the academic and administration buildings within the main grounds. There is an adjacent beach area for research and a nearby laboratory and recreation area. The total campus covers approximately 600 acres.

The Superintendent and central administrative officers, along with other service functions, are located in Herrmann Hall, the most prominent building on the campus because of its Spanish architecture.

Most of the academic classrooms, laboratories and offices are located in Spanagel, Bullard, Halligan, Root and Ingersoll Halls. The newest building is the Dudley Knox Library which was completed early in 1972. Adjacent to the main academic buildings is King Hall, a large lecture hall used to seat the student body, faculty, and staff when occasions require.

STUDENT AND DEPENDENT INFORMATION

Monterey Peninsula and the cities of Monterey, Carmel, Pacific Grove, and Seaside, all within 5 miles of the School, provide community support for the students of the Postgraduate School.

LaMesa Village, located 3 miles from the School, consists of former Wherry Housing, Capehart Housing and Townhouses. There are a total of 877 units of public quarters for officer students. An elementary school is located within the housing area. Limited housing for single students is available in the BOQ located on the main campus in Herrmann Hall.

Student services include a campus branch of Bank of America, Navy-Federal Credit Union, U.S. Post Office, Student Mail Center, Navy Exchange and a child care center. A large commissary is located at Fort Ord and is available to Navy personnel.

Medical facilities include a Dispensary, supported by the U.S. Army

Hospital at Fort Ord (7 miles away), and the U.S. Navy Hospital at Oakland (120 miles away). A Dental Clinic is located in Herrmann Hall.

The center of campus social activity is the Commissioned Officers and Faculty Club, located in the old hotel building. There are many beautifully appointed rooms, just as they were at the turn of the century, including a ballroom and Open Mess. Two beautiful chapels are located on the main campus.

Student wives and wives of allied officers are active in the Officer Student Wives Club, the International Wives Club, as well as a Little Theater group which puts on three productions a year.

Recreational facilities include a swimming pool, an 18-hole golf course, putting green, tennis courts, ping pong and badminton courts, basketball and volley ball courts, a softball diamond, picnic grounds, bowling lanes, driving range, archery range, and gymnasium. Other organized recreational activities are provided by the Ladies Golf Association, Mens Golf Association, Soccer Club, Rugby Club, Lacross Club, Ski Club, Karate Club, Tennis Club, and basketball and softball teams. The School also has a very active Military Amateur Radio Station and a Navy Flying Club.

Personnel assigned to the Postgraduate School have an active Sailing Association open to sponsors and their dependents as well as members of the faculty. Sailing conditions are among the finest on the West Coast with excellent weather prevailing from February through November. The School's recreation department schedules the 3 Shields Class Racing Sloops, 2 Santana-22s, 2 Columbia 22s, and 1 forty-foot launch on a first-come first-served basis. Classes for beginners and advanced sailing enthusiasts are conducted twice a year, following the January and July inputs. The School works closely with civilian yacht clubs to coordinate many sailing events throughout the year and, in addition, hosts the annual Navy West Coast Match racing championships.

TEXTBOOKS

The Naval Postgraduate School operates a bookstore under the Navy Exchange system. It stocks all required textbooks and related school supplies. Students can purchase their books either from the school or local bookstores, or from other students.

ADMISSIONS PROCEDURES

U.S. NAVAL OFFICERS

U. S. Navy officers interested in admission to one of the curricula offered at the Postgraduate School are referred to OPNAV Notice 1520, Subject: Postgraduate Educational Programs, which is published annually by the Chief of Naval Operations. This directive outlines the various educational programs available and indicates the method of submitting requests for consideration for each program.

A selection board is convened annually by the Chief of Naval Personnel to select officers, based upon professional performance, academic background, and ability, within quotas which reflect the Navy's requirements in the various fields of study available. Officers will be notified of selection by official correspondence at the earliest feasible date after the meeting of the selection board.

An officer's chances for selection will be enhanced if he has completed recommended preparatory courses for the graduate-education program of his choice. Appropriate courses for individual self-study are available from the Naval Postgraduate School Continuing Education Program, described in a following section of this catalog.

OTHER U.S. MILITARY OFFICERS

Officers on duty with other branches of service are eligible to attend the Postgraduate School. They should apply in accordance with the directives promulgated by the Department of the Army, Department of the Air Force, Commandant U.S. Marine Corps, or the Commandant U.S. Coast Guard, as appropriate.

ALLIED COUNTRY MILITARY OFFICERS

Military officers from Allied countries may be admitted to most curricula. Their admission is subject to availability of quotas assigned to each country. The procedures for application are contained in OPNAV INSTRUCTION 4950.1E. Correspondence must be processed through normal channels; requests from individual officers should not be sent directly to the Naval Postgraduate School. In addition to fluency in English, candidates must satisfy the academic standards for each curriculum as described in this catalog.

CIVILIAN EMPLOYEES OF U.S. GOVERNMENT

Civilian employees of the United States federal government may be admitted for study upon request and sponsorship by a federal activity. They do not need to pursue the curricula designed for officer students as described in this catalog but instead will determine the combination and sequence of courses that will best meet their educational needs.

Requests for admission should be in letter form, indicating the academic area of interest and degree intentions, and enclosing official transcripts of all previous college work. GRE and/or GMAT test scores are not required but will be considered when included in the submission.

Requests for admission or questions regarding admission procedures should be directed to the Dean of Academic Administration, Code 014, Naval Postgraduate School, Monterey, CA 93940; or telephone (408) 646-2392 or Autovon 878-2392.

TRANSFER OF CREDITS

Upon entry to the Naval Postgraduate School, each student's academic record will be evaluated for possible transfer of credit or for exemption from portions of the curricular program by validation of course work previous completed. Students may also utilize knowledge gained through self-study, experience or service-related education to seek validation or credit for curriculuar courses by taking a departmental examination.

Certain graduate-level courses previously completed may be accepted for transfer credit. These include graduate-level courses taken after completion of the baccalaureate degree and those taken in the last term before award of the baccalaureate and certified to be in excess of degree requirements.

As a consequence of its policy on transfer of credit, the School requires only 12 quarter hours in residency for the master's degree. Questions on transfer credit may be directed to the Dean of Academic Administration by letter or AUTOVON 878-2391.

DEGREES, ACCREDITATIONS, AND ACADEMIC STANDARDS

The Superintendent is authorized to confer Bachelor's, Master's, Engineer's or Doctor's degrees in engineering or related fields upon qualified graduates of the School. This authority is subject to such regulations as the Secretary of the Navy may prescribe, contingent upon due accreditation from time to time by the appropriate professional authority of the applicable curricula. Recipients of such degrees must be found qualified by the Academic Council in accordance with prescribed academic standards.

The Naval Postgraduate School was accredited in 1962 as a full member of the Western Association of Schools and Colleges. Initial accreditation as an associate member was given in 1955. Specific engineering curricula have been accredited by the Engineers' Council for Professional Development (ECPD) since 1949.

The Postgraduate School operates under a quarter system, with each term of instruction lasting 12 weeks. The last week of each quarter is set aside for examinations. In addition, there are two 2-week recesses during the academic year, one over Christmas and one during June-July.

Students' performance is evaluated on the basis of a quality point number assigned to the letter grade achieved in a course as follows:

Performance	*Grade*	*Point Value*
Excellent	A	4
	A−	3.7
	B+	3.3
	B	3
	B−	2.7
	C+	2.3
	C	2
	C−	1.7
	D+	1.3
	D	1
Failing	X	0
Incomplete	I	—
Withdrew Passing	W	—
Withdrew Failing	WX	0
Nongraded	N	—
Pass	P	—
Fail	F	—

Courses may be designated for P and F grading when approved by the Academic Department and the Academic Council. Hours earned by the grade of P shall be counted toward fulfilling course hours specified by the degree requirements.

A grade of Incomplete (I), if not removed within twelve weeks following the end of the term for which it was received, will be replaced by the grade "X." Exceptions must be individually approved by the Academic Council.

When the quarter-hour credit of a course is multiplied by the point value of the student's grade, a quality point value for the student's work in that course is obtained. The sum of the quality points for all courses divided by the sum of the

electrochemical cells, kinetic theory of gases and introductory atomic and molecular structure.

CH 2910 Interaction of Naval Operations and Environmental Pollution (4-0).
An interdisciplinary course which examines the impact of environmental pollution on Naval operations by examining current technical status, future plans for abatment, and the resultant limitations placed on Naval facilities, especially ships. The course will consider air, water, nuclear, and noise pollution or the potential for pollution as appropriate. PREREQUISITES: Math through college algebra. Two quarters of physical science or biology within the last two years is desirable.

Upper Division or Graduate Courses

CH 3101 Advanced Inorganic Chemistry (3-3).
Coordination compounds and crystal field theory. Inorganic reaction mechanisms. The laboratory introduces the student to general methods for investigating chemical reaction. PREREQUISITES: CH 2101, CH 2403.

CH 3301 Physical Organic Chemistry (3-0).
First quarter of two-quarter sequence. In this term the tools available for the study of organic mechanisms are discussed and apppropriate examples used. PREREQUISITES: CH 2302, CH 3101.

CH 3402 Physical Chemistry in Ordnance Systems (4-2).
A course in topics of special interest to students in Ordnance Engineering. Thermochemistry, chemical equilibrium, chemical kinetics, electrochemistry. Applications will include problems in explosives and propellants, corrosion, fuel cells, remote sensors, and environmental effects. The laboratory will amplify the lecture material especially through the use and study of chemical instruments. PREREQUISITES: PH 2551; a previous course in chemistry.

CH 3403 Chemical Thermodynamics (3-0).
Application of thermodynamics to ideal and to real gases, non-electrolyets, electrolytic solutions, multicomponent solutions. Calculations of equilibria, estimation of thermodynamic quantities and brief discussion of calculations of thermodynamic properties from spectroscopic and other molecular data. PREREQUISITES: Physical chemistry, elementary thermodynamics.

CH 3405 Molecular Dynamics (5-0).
Direct application of the Schroedinger wave equation to the hydrogen atom, angular momentum, matrix formulation of quantum mechanics, electro spin, the Pauli principle, interaction with electromagnetic radiation, development of group theory and application in quantum mechanics, and application of preceding framework to molecular hydridization, molecular orbital theory, ligand field theory, and vibrational spectra. PREREQUISITES: CH 2403, Matrix algebra.

CH 3415 Statistical Mechanics (4-0).
A general treatment of the principles of quantum and classical statistical mechanics with applications to chemical systems. Included are distribution laws and the relationships of Fermi-Dirac, Bose-Einstein, and corrected Boltzmann statistics, applications to chemical equilibria, diatomic and polyatomic molecules including ortho and para hydrogen; canonical and grand canonical ensembles; real gases. PREREQUISITES: CH 2403.

CH 3761 Explosives Technology (4-0).
Characteristics and terminology applied to explosives and propellants, manufacture and fabrication of explosives and explosive devices, detonics, thermochemical, and chemical kinetics of detonations. PREREQUISITES: PH 2551, CH 2402, and MS 2201 or equivalent.

CH 3998 Special Topics in Intermediate Chemistry (1-0 to 4-0).
Study in one of the fields of intermediate chemistry selected to meet special needs or interests of students. The course may be conducted as seminar or supervised reading and carries a letter grade. It may be repeated in different topics. It may also be taken on pass-fail basis if the student has requested so at the time of enrollment. PREREQUISITE: Consent of the Department Chairman.

Graduate Courses

CH 4302 Physical Organic Chemistry II (3-0).

The techniques discussed in CH 3301 are used in the study of organic reaction mechanisms as currently understood. PREREQUISITE: CH 3301.

CH 4406 Quantum Chemistry (3-0).
A study of molecular spectra and molecular electronic structure, emphasizing theory, interpretation, and prediction of spectra utilizing the quantum mechanical formulation. PREREQUISITE: CH 3405.

CH 4410 Chemical Kinetics (3-0).
Experimental methods and interpretations of data. Collision theory and activated-complex theory. Mechanisms of reactions. PREREQUISITES: CH 2403 and consent of Instructor.

CH 4505 Radiation Chemistry (3-0).
A study of the theory behind the chemical processes occurring when ionizing and electromagnetic radiation interact with matter. Includes electronic states of molecules, introduction to photochemistry, properties of gaseous ions and free radicals, chain reactions. PREREQUISITE: CH 2403 or the equivalent.

CH 4998 Special Topics in Advanced Chemistry (1-0 to 4-0).
Study in one of the fields of advanced chemistry or related applied areas selected to meet special needs or interest of students. The course may be conducted as seminar or supervised reading, carries a letter grade and may be repeated in different topics. It may also be taken on pass-fail basis if the student has requested so at the time of enrollment. PREREQUISITE: Consent of Department Chairman.

OTHER COURSES

SE 2001 through SE 4006 are a series of courses specifically designed for students in the Naval Intelligence Curriculum (825).

Upper Division Courses

SE 2001 Environment, Wave Propagation and Ocean Systems (4-0).
This is the first course of a five course sequence designed for the Naval Intelligence Curriculum to introduce the concepts of military technology. In this course, basic concepts of environmental science are reviewed and related to environmental data networks, environmental effects upon the propagation of acoustic and electromagnetic waves are studied, fundamentals of acoustic surveillance systems are developed, and current capabilities are discussed.

SE 2002-2003 Concepts of Science and Engineering I-II (4-0).
A two course sequence designed to prepare an advanced student with a non-quantitative and non-technical background for the study of advanced technology systems. Topics include: linear systems modeling and characteristics, spectral analysis, wave properties and wave phenomena, and computer systems; photography and photogrammetry, communication systems, signal processing, and control systems. PREREQUISITE: Mathematics including an introduction to differential and integral calculus.

SE 2279 Directed Studies in Science and Engineering (Credit open).
Independent study in science and engineering topics in which formal course work is not offered. PREREQUISITE: Permission of Department Chairman. *Graded on Pass/Fail basis only.* (Graduate students register for SE 3279).

Upper Division or Graduate Courses

SE 3004-3005 Survey of Military Technology: Concepts and Applications I-II (4-0).]
A two course sequence designed to familiarize the student with the conceptual basis of military applications of technology. The first course treats communications systems, radar systems, electronic surveillance systems and electrooptics systems. The second treats strategic systems, satellite systems, missile systems, selected topics in aeronautical and naval engineering, and acoustic surveillance systems. PREREQUISITES: SE 2003, or equivalent, and SECRET clearance (NOFORN).

SE 3279 Directed Studies in Science and Engineering (Credit open). (See SE 2279). *Graded on Pass/Fail basis only.*

Graduate Courses

SE 4006 Special Topics in Technology Assess-

ment (4-0).
Methods by which the technological capabilities of a nation, either current of future, will be assessed. Problems in source evaluation, cross-impact analysis, and trend extrapolation. Delphi studies and their role. As a part of their seminar, the student will make a detailed study and report on the methodology and results of a current technology assessment study. Content will vary, depending upon availability of material and the current interests of the professor and students. PREREQUISITES: SE 3004, SE 3005, and SECRET clearance (NOFORN).

SE 4064 Comparative Command, Control, Communications and Ocean Surveillance (3-0).
An examination of the command and organizational structures, control philosophies, communications systems and ocean surveillance systems of the Soviet and US Navis. The course begins with the Soviet approach which is used as a basis of comparison with the US approach. Possible exploitable features of the command and control structure are considered. The course emphasizes readings in the appropriate literature, research and seminar discussions. PREREQUISITES: NS 3420, TOP SECRET clearance with access to special intelligence information. SE 2003, OS 3207 or equivalent. *May also be taught as NS 4064.*

DEFENSE RESOURCES MANAGEMENT EDUCATION CENTER

Tyler Freeland Dedman, Rear Admiral, U.S. Navy, Director: B.S., U.S. Naval Academy, 1947; B.S. in Aeronautical Engineering, Naval Postgraduate School, 1956; M.S. in Engineering, Princeton Univ., 1957.

John Edward Dawson, Professor; Executive Director (1966)*; B.A., The Principia College, 1953; M.P.A., Syracuse Univ., 1954; D.P.A., 1971.

Sherman Wesley Blandin, Jr., Associate Professor; Assistant Director, Defense Activities (1968); B.S., U.S. Naval Academy, 1944; B.S., Georgia Institute of Technology, 1952; M.S., 1953; M.B.A., Univ. of Santa Clara, 1973; Ph.D., 1977.

Edwin John Doran, Adjunct Professor; Assistant Director, Academic Programs (1975); B.A., Univ. of Pennsylvania, 1955; M.S., Naval Postgraduate School, 1968; M.B.A., Univ. of Santa Clara, 1972; Ph.D., 1977.

William Alan Mauer, Professor, Assistant Director of Faculty Development and Research (1966); A.B., San Jose State College, 1955; M.S., Agricultural and Mechanical College of Texas, 1957; Ph. D., Duke Univ., 1960.

Alexander Wolfgang Rilling, Associate Professor; Assistant Director, International Activities (1974); B.S., Rensselaer Polytechnic Institute, 1951; M.S., Naval Postgraduate School, 1962; Ph.D., Univ. of Southern California, 1972.

Robert Moffat Allan, Jr., Professor (1971); B.A., Stanford Univ., 1941; M.S., Univ. of California at Los Angeles, 1942.

James Sherman Blandin, Assistant Professor (1974); B.A., Univ. of California at Santa Barbara, 1968;M.B.A., Univ. of Oregon, 1972; Ph.D., 1974.

Robert Edward Boynton, Associate Professor (1970); B.A., Univ. of Minnesota, 1956; M.A., 1962; Ph.D., Stanford Univ., 1968.

John Paul Brennan, Lieutenant Commander, U.S. Navy; Assistant Professor (1974); B.S. Univ. of California at Berkeley, 1961; M.B.A., California Lutheran College, 1974.

William Ayers Campbell, Associate Professor (1970); B.S., Tuskegee Institute College, 1937; M.S.I.M., Univ. of Pittsburgh Graduate School, 1949.

Frank Elmer Childs, Professor (1965); B.A. Williamette Univ., 1934; M.B.A., Univ. of Southern California, 1936; Ph.D., Univ. of Minnesota, 1956.

William Frederick Dunbar, Major, U.S. Air Force; Instructor (1975); B.B.A., Univ. of Wisconsin, 1961; M.A., Southern Methodist Univ., 1973.

Charles Joseph Forsman, Commander, U.S. Navy; Instructor (1976); B.S. Naval Academy, 1958; M.S., George Washington Univ., 1967; M.S., Naval Postgraduate School, 1973.

Peter Carl Frederiksen, Assistant Professor (1974); B.A., Golden Gate College, 1967; M.A., San Francisco State College, 1969; Ph.D., Washington State Univ., 1974.

Clyde Joseph Johnston, Lieutenant Colonel, U.S. Marine Corps, Instructor (1976); B.S., Univ. of Colorado, 1959; M.B.A., Harvard Univ., 1970.

Louis Henry Knipling, Jr., Colonel, U.S. Army; Assistant Professor (1976); B.S., Carnegie Tech, 1948; M.S. Ohio State Univ., 1956; Ph.D., 1973.

Clifford Monson MacDonald, Jr., Major, U.S. Army; Instructor (1977); B.S., Worcester Polytechnic Institute, 1964; M.B.A., Drexel Univ., 1973.

Norman Plotkin, Assistant Professor (1969); B.S., Univ. of California at Los Angeles, 1948; B.F.S., Georgetown Univ., 1950; M.S., Claremont Graduate School, 1966; Ph.D., 1969.

Richard Edward Saunders, Commander, U.S. Navy; Assistant Professor (1977); B.S., Naval Postgraduate School, 1967; M.S., 1970.

Robert von Pagenhardt, Professor (1967); A.B., Stanford Univ., 1948; M.S., 1954: Ph.D., 1970.

Gerald Allen Whitney, Assistant Professor (1977); B.S., Nicholls State Univ., 1968; Ph.D., Tulane Univ., 1977.

Richard Dana Young, Assistant Professor (1977); B.A., Humboldt State College, 1969; Ph.C Univ. of California at Santa Barbara, 1973.

**The year of joining the Postgraduate School Faculty is indicated in parenthesis.*

DEFENSE RESOURCES MANAGEMENT EDUCATION CENTER

The Navy Management Systems Center, a jointly staffed DoD sponsored activity, was established as a separate Naval Activity in February 1966. As of 1 July 1974 the name was changed to Defense Resources Management Education Center. It conducts both resident and on-site defense resource management courses for U.S. and international military personnel of all services in grades 0-4 and above and military-related civilians of equal grades. The focus of all programs conducted by the Center is on the development of knowledge and improvement of understanding of the concepts, techniques and application of modern defense management systems, with specific emphasis on effective resource management.

The Center currently offers a four-week U.S. Defense Management Systems Course eight times each year, a one-week Flag/General Defense Management Course twice each year, a thirteen-week Senior International Defense Management Course one time each year (similar to the 13-week international course but contracted). In addition to the DoD programs, the Center is currently involved in presenting management programs on-site to the service components and selected governments.

Since 1966, the Center has graduated over 10,000 students.

Faculty members of the Center are a part of the regular faculty of the Postgraduate School.

DEFENSE MANAGEMENT SYSTEMS COURSE

The Planning-Programming-Budgeting System as developed since 1961 by the Office of the Secretary of Defense has provided a framework for examining various force mixes, allocation of resources, and relationships to military capabilities.

The objective of the 4-week Defense Management Systems Course is to provide an appreciation of the concepts, principles, and methods of defense management as they concern planning, programming, budgeting, and related activities. The course covers force planning, Department of Defense programming, program budgeting, and their interrelationships with resource management systems. Emphasis is placed on the analytical aspects of management, steming from the disciplines of management decision theory, economics, and quantitative analysis.

Students are not expected to become experts or technicians in the various disciplines and subjects included in the curriculum. The objectives are to provide orientation on the overall functioning of the defense management process, insights as to what defense management requires in the way of inputs and analysis for decision-making, understanding of the principles, methods and techniques used, and awareness of the interfaces between management requirements of the Department of Defense components and the Office of the secretary of Defense. Course methodology includes lectures, small group discussions reinforced by illustrated case studies and problem sets, as well as selected daily reading assignments.

FLAG/GENERAL DEFENSE MANAGEMENT COURSE

The Flag/General course is a one-week program of professional continuing education that is designed to improve understanding of the concepts, principles, methods and techniques drawn from the disciplines of management decision theory, economics and quantitative analysis. These ideas are integrated into a systematic framework for decision making. Applications include analysis and evaluation of defense systems, programs and polices and the allocation of scarce resources among programs. Course methodology includes lectures, small group discussions reinforced by illustrated case studies and problem sets, as well as selected daily reading assignments.

INTERNATIONAL DEFENSE MANAGEMENT COURSE

The course is designed for participants in the military grades of 0-4 (Major/Lieutenant Commander) through 0-6 (Colonel/Captain) and defense-related civilians of equivalent rank. Enrollment is currently limited to a maximum of 50 participants. Broad national representation is desired for this course, i.e., participation by at least eight or ten nations enhances the value of the comparative management aspects of the curriculum.

The Course is presented in English.

The course provides a series of lectures in three major areas: environmental factors; quantitative and economic analysis; and management systems in the context of strategy, implementation, and operations. The lectures are supplemented by small group discussions and workshops which concentrate on the lecture topics and associated readings, problems, and cases. In the discussion groups, faculty members guide the interchange of ideas and are available to answer questions. Readings are assigned from within texts and supplemental material given to the participants to facilitate preparation for each lecture. Lecture outlines with additional suggested reading lists are provided. Occasional open seminar speakers are invited for special topics.

Early in the course, participants are requested to give brief presentations (by country) on their particular environmental situations, including such information as geographic factors, economic factors, social and cultural considerations, governmental and defense organizations, and unique management situations and/or problems. Throughout the course, the participants are encouraged to present and discuss information with respect to the defense management systems of their countries, and to examine how the management concepts and techniques discussed by both the Center faculty and the participants from other countries may be applied in their own situations. Comparative study by means of interaction among participants is considered to be an extremely valuable characteristic of the course.

During the course, the Center conducts field trips to selected military and commercial installations in the central California area. These trips provide an opportunity for the participants to receive special briefings on management techniques and problems, and to observe actual practices at the operating level.

In the second half of the course the general concepts of defense management are elaborated in detail during the examination of actual systems in financial, material and human resources management. At the end of the course a general review integrates the formal course material, special topics, and field trip experiences.

SENIOR INTERNATIONAL DEFENSE MANAGEMENT COURSE

Enrollment is restricted to military flag and general officers (grades 0-7 and above) and defense-related civilians of equivalent rank, except that for countries where the 0-6 grade is comparable to flag/general rank such officials may be enrolled on a waiver basis. Participation in past courses has been as high as 45 individuals from as many as 18 countries; a maximum of 50 participants can be accommodated.

The Course is presented in English.

The lecture, small discussion group, environmental seminar, case study and problem format and content described above for IDMC also applies, but compressed in time. Two or three guest speakers are included and a field trip is conducted.

DISTINGUISHED ALUMNI

Among those who have completed a Naval Postgraduate School curriculum who attained flag (USN) or general (USMC) rank on the active list are the following: (The asterisk [*] indicates those on active list as of 1 October 1977.)

Admiral Walter F. Boone
Admiral Arleigh A. Burke
Admiral Maurice E. Curts
Admiral Robert L. Dennison
Admiral Donald B. Duncan
Admiral Cato D. Glover, Jr.
Admiral Roscoe F. Good
Admiral Charles D. Griffin
Admiral Byron H. Hanlon
Admiral Ephraim P. Holmes
Admiral Frederick H. Michaelis*
Admiral Albert G. Noble
Admiral Alfred M. Pride
Admiral James C. Richardson
Admiral Hyman G. Rickover*
Admiral Horacio Rivero, Jr.
Admiral James S. Russell
Admiral Ulysses S. G. Sharp, Jr.
Admiral John H. Sides
Admiral Felix B. Stump
Admiral Alfred G. Ward
Admiral John M. Will
Vice Admiral Robert E. Adamson, Jr.
Vice Admiral Parker B. Armstrong*
Vice Admiral Frederick L. Ashworth
Vice Admiral Harold D. Baker
Vice Admiral Wallace M. Beakley
Vice Admiral George F. Beardsley
Vice Admiral Frank E. Beatty
Vice Admiral Fred G. Bennett
Vice Admiral Charles T. Booth, II
Vice Admiral Harold G. Bowen, Jr.
Vice Admiral John L. Boyes
Vice Admiral Carleton F. Bryant
Vice Admiral William M. Callaghan
Vice Admiral John H. Carson
Vice Admiral Ralph W. Christie
Vice Admiral John B. Colwell
Vice Admiral Thomas F. Connolly
Vice Admiral Glenn B. Davis
Vice Admiral Vincent P. Depoix
Vice Admiral Harold T. Deutermann
Vice Admiral Glynn R. Donaho
Vice Admiral Irving T. Duke
Vice Admiral Clarence E. Ekstrom
Vice Admiral Albert J. Fay
Vice Admiral Emmet P. Forrestel
Vice Admiral Laurence H. Frost
Vice Admiral William E. Gentner, Jr.
Vice Admiral Arthur R. Gralla
Vice Admiral Elton W. Grenfell
Vice Admiral Robert W. Hayler
Vice Admiral Truman J. Hedding
Vice Admiral Edwin B. Hooper*
Vice Admiral George F. Hussey, Jr.
Vice Admiral Thomas B. Inglis
Vice Admiral Andrew M. Jackson, Jr.
Vice Admiral Albert E. Jarrell
Lieutenant General Clayton C. Jerome
Vice Admiral Robert T.S. Keith
Vice Admiral Ingolf N. Kiland
Vice Admiral Jerome H. King, Jr.
Vice Admiral Harold O. Larson
Vice Admiral Kent L. Lee
Vice Admiral Ruthven E. Libby
Vice Admiral Vernon L. Lowrance
Vice Admiral William J. Marshall
Vice Admiral Charles B. Martell
Vice Admiral Kleber S. Masterson
Vice Admiral Ralph E. McShane
Vice Admiral Charles L. Melson
Vice Admiral Marion E. Murphy
Vice Admiral Lloyd M. Mustin
Vice Admiral Frank O'Beirne
Vice Admiral Francis P. Old
Vice Admiral Howard E. Orem
Vice Admiral Harvey E. Overesch
Vice Admiral Edward N. Parker
Vice Admiral Raymond E. Peet
Vice Admiral Forrest S. Petersen*
Vice Admiral Charles A Pownall
Vice Admiral Thomas C. Ragan
Vice Admiral Lawson P. Ramage
Vice Admiral William L. Rees
Vice Admiral Robert H. Rice
Vice Admiral Rufus E. Rose
Vice Admiral Richard W. Ruble
Vice Admiral Theodore D. Ruddock, Jr.
Vice Admiral Lorenzo S. Sabin, Jr.
Vice Admiral Harry Sanders
Vice Admiral Walter G. Schindler
Vice Admiral William A. Schoech
Vice Admiral Harry E. Sears
Vice Admiral Thomas G.W. Settle
Vice Admiral Wallace B. Short
Vice Admiral William R. Smedberg, III
Vice Admiral Chester C. Smith
Vice Admiral John V. Smith
Vice Admiral Roland N. Smoot
Lieutenant General Edward W. Snedeker
Vice Admiral Selden B. Spangler
Vice Admiral Thomas M. Stokes
Vice Admiral John Sylvester
Vice Admiral George C. Towner
Vice Admiral Robert L. Townsend
Vice Admiral Aurelius B. Vosseller
Vice Admiral Thomas J. Walker, III
Vice Admiral Edward C. Waller, III*
Vice Admiral James D. Watkins*

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Vice Admiral Charles Wellborn, Jr.
Vice Admiral Ralph Weymouth
Vice Admiral Ralph E. Wilson
Rear Admiral William C. Abhau
Rear Admiral Charles Adair
Rear Admiral John W. Ailes, III
Rear Admiral Herbert S. Ainsworth
Rear Admiral Frank Akers
Rear Admiral David M. Altwegg*
Rear Admiral John H. Alvis
Rear Admiral Charles C. Anderson
Rear Admiral Herbert H. Anderson
Rear Admiral Roy G. Anderson
Rear Admiral Willam L. Anderson
Rear Admiral Burton H. Andrews
Rear Admiral Erasmus W. Armentrout, Jr.
Rear Admiral Henry J. Armstrong
Rear Admiral Henry D. Arnold*
Major General George C. Axtell, Jr.
Rear Admiral Lee Baggett, Jr.*
Rear Admiral Watson O. Bailey
Rear Admiral William B. Bailey
Rear Admiral Fred E. Bakutis
Rear Admiral Nathaniel C. Barker
Rear Admiral Edwin Barrineau*
Rear Admiral Richard W. Bates
Rear Admiral Robert L. Baughan, Jr.
Rear Admiral Fred H. Baughman*
Rear Admiral John K. Beling
Rear Admiral David B. Bell
Rear Admiral Allan A. Bergner
Rear Admiral Philip A. Beshany
Rear Admiral Abel T. Bidwell
Rear Admiral Karl J. Bierderman
Major General Arthur F. Binney
Rear Admiral Horace V. Bird
Rear Admiral Worthington S. Bitler
Brigadier General Herbert J. Blaha
Rear Admiral Earnest Blake
Rear Admiral Calvin M. Bolster
Rear Admiral William A. Bowers
Rear Admiral Selman S. Bowling
Rear Admiral Frank A. Braisted
Rear Admiral Boynton L. Braun
Brigadier General George R. Brier
Rear Admiral Edward S. Briggs*
Rear Admiral Harold M. Briggs
Rear Admiral William A. Brockett
Rear Admiral Robert Brodie, Jr.
Rear Admiral Clarence Broussard
Rear Admiral Bert F. Brown
Rear Admiral Henry C. Bruton
Rear Admiral William C. Bryson
Rear Admiral Charles A. Buchanan
Rear Admiral William H. Buracker
Rear Admiral Raymond W. Burk
Rear Admiral Sherman E. Borroughs
Rear Admiral Jose M. Cabanillas
Rear Admiral William M. Callaghan, Jr.*
Rear Admiral Joseph W. Callahan
Rear Admiral Lucien Capone, Jr.*
Rear Admiral Robert W. Carius*
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Rear Admiral Milton O. Carlson
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Rear Admiral Edward W. Carter, III*
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Rear Admiral Gordon L. Caswell
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Rear Admiral Karl J. Christoph, Jr.*
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Rear Admiral Henry G. Clark
Rear Admiral Jeane R. Clark
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Rear Admiral Joe B. Cochran
Brigadier General Harold L. Coffman
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Rear Admiral Philip P. Cole
Rear Admiral William M. Cole
Rear Admiral Byran W. Compton, Jr.*
Rear Admiral Warren M. Cone
Rear Admiral Robert C. Conolly, II*
Rear Admiral Murray C. Cook*
Rear Admiral Samual M. Cooley, Jr.
Rear Admiral Joshua W. Cooper
Rear Admiral Frank W. Corley, Jr.
Rear Admiral John T. Corwin
Rear Admiral John T. Coughlin*
Rear Admiral Stanley T. Counts*
Rear Admiral Roy T. Cowdrey
Rear Admiral Donald V. Cox
Rear Admiral Richard S. Craighill
Rear Admiral John S. Crenshaw
Rear Admiral Samuel H. Crittenden, Jr.
Rear Admiral Robert E. Cronin
Rear Admiral Gordon J. Crosby
Rear Admiral John E. Dacey
Rear Admiral Anthony L. Danis
Rear Admiral James A. Dare
Rear Admiral Lawrence R. Daspit
Rear Admiral Cabell S. Davis, Jr.*
Rear Admiral Henry J. Davis, Jr.*
Rear Admiral James W. Davis
Rear Admiral John B. Davis, Jr.
Rear Admiral Ranson K. Davis
Rear Admiral Kenneth V. Dawson

Rear Admiral Dwight H. Day
Rear Admiral George H. Debaun
Rear Admiral Tyler F. Dedman*
Rear Admiral Walter Dedrick
Rear Admiral Ernest W. Dobie, Jr.
Rear Admiral Frank R. Dodge
Rear Admiral Joseph E. Dodson
Rear Admiral Oscar H. Dodson
Rear Admiral Marshall E. Dornin
Rear Admiral Jack S. Dorsey
Rear Admiral Wallace R. Dowd, Jr.
Rear Admiral Willard M. Downes
Rear Admiral Clayton R. Dudley
Rear Admiral Clifford H. Duerfeldt
Rear Admiral Robert F. Dunn*
Rear Admiral Crawford A. Easterling*
Rear Admiral Henry E. Eccles
Rear Admiral Edward H. Eckelmeyer, Jr.
Rear Admiral Claude P. Ekas, Jr.*
Rear Admiral Donald T. Eller
Rear Admiral Robert B. Ellis
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Rear Admiral Gordon S. Everett
Rear Admiral Marvin P. Evenson
Rear Admiral Delmer S. Fahrney
Rear Admiral Edward J. Fahy
Rear Admiral James M. Farrin, Jr.
Rear Admiral Emerson E. Fawkes
Rear Admiral James M. Fernald
Rear Admiral William E. Ferrall
Rear Admiral Clifford A. Fines
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Rear Admiral Morton K. Fleming, Jr.
Rear Admiral William B. Fletcher, Jr.
Rear Admiral William O. Floyd
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Rear Admiral Etheridge Grant
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Rear Admiral Bradford E. Grow
Rear Admiral James C. Guillot
Rear Admiral William A. Gureck*
Rear Admiral Frank S. Haak
Rear Admiral Frederic S. Habecker
Rear Admiral Wesley M. Hague
Rear Admiral Stanley M. Haight
Rear Admiral Hamilton Hains
Rear Admiral Grover B.H. Hall
Rear Admiral George G. Halvorson
Rear Admiral DeWitt C.E. Hamberger
Rear Admiral Warren C. Hamm, Jr.*
Rear Admiral William M. Harnish
Rear Admiral Harold S. Harnly
Rear Admiral William L. Harris, Jr.*
Rear Admiral Lloyd Harrison
Rear Admiral Clarence N. Hart
Rear Admiral Robert S. Hatcher
Rear Admiral Valery Havard, Jr.
Rear Admiral Hugh E. Haven
Rear Admiral Kenneth G. Haynes*
Rear Admiral William R. Headden
Rear Admiral Vincent P. Healey
Rear Admiral George L. Heath
Rear Admiral Ralph R. Hedges*
Rear Admiral Paul R. Heineman
Rear Admiral Guy B. Helmick
Rear Admiral William P. Hepburn
Rear Admiral Lee R. Herring
Rear Admiral Edwin W. Herron
Rear Admiral Clarence A. Hill
Rear Admiral Wellington T. Hines
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Rear Admiral Charles M.E. Hoffman
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Rear Admiral James H. Hogg
Rear Admiral James B. Hogle
Rear Admiral M. Staser Holcomb*
Rear Admiral George A. Holderness, Jr.
Rear Admiral Paul A. Holmberg
Rear Admiral Carl C. Holmquist
Rear Admiral Leroy V. Honsinger
Rear Admiral Lewis A. Hopkins
Rear Admiral Charles F. Horne, Jr.
Rear Admiral Martin P. Hottel
Rear Admiral Herbert S. Howard
Rear Admiral Hamilton W. Howe
Rear Admiral Miles H. Hubbard
Rear Admiral Lester J. Hudson
Rear Admiral Harry Hull
Rear Admiral Harry R. Hummer, Jr.
Rear Admiral George P. Hunter
Rear Admiral William D. Irvin
Rear Admiral Joseph A. Jaap
Major General Samuel S. Jack
Rear Admiral David H. Jackson
Rear Admiral Jack M. James
Rear Admiral Ralph K. James
Rear Admiral Joseph F. Jelley, Jr.

Rear Admiral George E. Jessen*
Rear Admiral Frank L. Johnson
Rear Admiral Harry D. Johnston
Rear Admiral Horace B. Jones
Rear Admiral Allen R. Joyce
Rear Admiral William W. Juvenal
Rear Admiral Benjamin Katz
Rear Admiral Bruce Keener, III*
Rear Admiral Thomas J. Kelly
Rear Admiral John D. Kelsey
Rear Admiral Cecil J. Kempf*
Rear Admiral Marvin G. Kennedy
Rear Admiral John S. Kern
Rear Admiral Thomas J. Kilcline*
Rear Admiral Thomas S. King, Jr.
Rear Admiral Robert E. Kirksey*
Rear Admiral Thomas B. Klakring
Rear Admiral William M. Klee
Rear Admiral Arthur K. Knoizen*
Rear Admiral Denys W. Knoll
Rear Admiral Theodore H. Kobey
Rear Admiral Leland S. Kollmorgan*
Rear Admiral Edgar P. Kranzfelder
Rear Admiral William E. Kuntz
Rear Admiral Thomas R. Kurtz, Jr.
Rear Admiral David Lambert
Major General Frank H. Lamson-Scribner
Rear Admiral George A. Lange
Rear Admiral Richard A. Larkin
Rear Admiral Robert E. Laub
Rear Admiral Paul A. Lautermilch, Jr.*
Rear Admiral Martin J. Lawrence
Rear Admiral Frank C. Layne
Rear Admiral William H. Leahy
Rear Admiral Paul F. Lee
Rear Admiral Wilson D. Leggett, Jr.
Rear Admiral William E. Lemos
Rear Admiral John C. Lester
Rear Admiral Joseph S. Lillard
Rear Admiral Isham W. Linder
Rear Admiral Orlin L. Livdahl
Rear Admiral William H. Livingston
Rear Admiral Theodore C. Lonnquest
Rear Admiral Almon E. Loomis
Rear Admiral Wayne R. Loud
Rear Admiral Charles H. Lyman, III
Rear Admiral Duncan C. MacMillan
Rear Admiral Charles J. Maguire
Rear Admiral Joseph B. Maher
Rear Admiral Robert C. Mandeville, Jr.*
Rear Admiral Francis F. Manganaro*
Rear Admiral Harry C. Mason
Rear Admiral Bob O. Mathews
Rear Admiral William S. Maxwell
Rear Admiral Brian McCauley
Rear Admiral Thomas R. McClellan
Rear Admiral Melvyn H. McCoy
Rear Admiral Francis C. B. McCune
Major General Keith B. McCutcheon
Rear Admiral Eugene F. McDaniel
Rear Admiral William T. McGarry
Rear Admiral John B. McGovern
Rear Admiral Donald McGregor
Rear Admiral Harry H. McIlhenny
Rear Admiral Fran McKee*
Rear Admiral Logal McKee
Rear Admiral James E. McKenna*
Rear Admiral William R. McKinney
Rear Admiral John B. McLean
Rear Admiral Philip S. McManus
Rear Admiral James A. McNally
Rear Admiral Robert W. McNitt
Rear Admiral Francis J. Mee
Rear Admiral John L. Melgaard
Rear Admiral Robert E. Melling
Rear Admiral Wm. K. Mendenhall, Jr.
Rear Admiral Joseph Metcalf, III*
Rear Admiral Jeffrey C. Metzel, Jr.*
Rear Admiral Wayne E. Meyer*
Rear Admiral Roderick O. Middleton
Major General John H. Miller
Rear Admiral George H. Miller
Rear Admiral Rupert S. Miller
Rear Admiral Robert G. Mills
Rear Admiral Clinton A. Misson
Rear Admiral Chauncey Moore
Rear Admiral Michael U. Moore
Rear Admiral Robert L. Moore, Jr.
Rear Admiral Henry G. Moran
Rear Admiral Armand M. Morgan
Rear Admiral James B. Morin*
Rear Admiral Robert W. Morse
Rear Admiral Thomas H. Morton
Rear Admiral Douglas F. Mow*
Rear Admiral William E. Mullan
Rear Admiral Allen P. Mullinnix
Rear Admiral Albert C. Murdaugh
Rear Admiral Charles D. Murphey
Rear Admiral John W. Murphy, Jr.
Rear Admiral James D. Murray, Jr.*
Rear Admiral Richard E. Myers
Rear Admiral Gordon R. Nagler*
Rear Admiral Oliver F. Naquin
Rear Admiral Frederick J. Nelson
Major General Noah C. New
Rear Admiral Charles A. Nicholson, II
Rear Admiral William R.D. Nickelson, Jr.
Rear Admiral Philip Niekum, Jr.
Rear Admiral Hugh R. Nieman, Jr.
Rear Admiral William Nivison*
Rear Admiral Emmet O'Beirne
Rear Admiral Timothy J. O'Brien
Rear Admiral Edward J. O'Donnell
Rear Admiral Jack F. O'Hara*
Rear Admiral Eliot Olsen
Rear Admiral William H. Organ
Rear Admiral James B. Osborn
Rear Admiral William W. Outerbridge
Rear Admiral Thomas B. Owen
Rear Admiral Samuel H. Packer, II*

Rear Admiral James R. Pahl
Rear Admiral Roger W. Paine
Rear Admiral Edward E. Pare
Rear Admiral Charles W. Parker
Rear Admiral Goldsborough S. Patrick
Rear Admiral John B. Pearson, Jr.
Rear Admiral John H. Pedersen
Rear Admiral Henry S. Persons
Rear Admiral Carl J. Pfingstag
Rear Admiral Neill Phillips
Rear Admiral Richard H. Phillips
Rear Admiral Ben B. Pickett
Rear Admiral Paul E. Pihl
Rear Admiral Frank L. Pinney, Jr.
Rear Admiral Donald T. Poe
Rear Admiral Karl F. Poehlmann
Rear Admiral Frank H. Price
Rear Admiral Walter H. Price
Rear Admiral Charles O. Prindle*
Rear Admiral William M. Pugh, II
Rear Admiral Schuyler N. Pyne
Rear Admiral Alston Ramsay
Rear Admiral William T. Rassieur
Rear Admiral Charles F. Rauch, Jr.
Rear Admiral Ralph W. Rawson
Rear Admiral Harry L. Reiter, Jr.
Rear Admiral Thomas H. Replogle*
Rear Admiral James R.Z. Reynolds
Rear Admiral Joseph E. Rice
Rear Admiral Alvin F. Richardson
Rear Admiral Robert E. Riera
Rear Admiral Basil N. Rittenhouse, Jr.
Rear Admiral Charles W. Rixey*
Rear Admiral James M. Robinson
Rear Admiral Walter F. Rodee
Rear Admiral William K. Romoser
Rear Admiral John B. Rooney
Rear Admiral Conrad J. Rorie*
Rear Admiral William H. Rowden*
Rear Admiral Gordon Rowe
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Rear Admiral Edward A. Ruckner
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June 1978 Graduation

POSTGRADUATE SCHOOL STATISTICS GRADUATES BY YEARS

POSTGRADUATE SCHOOL STATISTICS
GRADUATES BY YEARS

	1946-1950	1951-1955	1956-1960	1961-1965	1966-1970	1971-1975	1976	1977	Total
Bachelor of Arts	....	....	....	180	389	349	1	....	919
B.S. in Aeronautical Engineering	73	212	212	181	61	15	....	....	754
B.S. in Chemistry	....	....	3	3	4	9	....	....	19
B.S. in Engineering Acoustics	....	....	....	....	....	3	3	1	7
B.S. in Electrical Engineering	156	292	232	520	308	186	14	22	1,730
B.S. in Engineering Science	....	....	....	....	141	135	....	....	276
B.S. in Environmental Science	....	....	....	12	....	....	....	....	12
B.S. in Management	....	....	....	53	1	....	....	....	54
B.S. in Mechanical Engineering	43	116	52	82	53	26	5	....	377
B.S. in Meteorology	16	104	77	108	49	29	....	....	383
B.S. in Operations Research	....	....	....	....	49	63	5	2	119
B.S. in Physics	....	15	36	75	35	19	2	....	182
B.S. in Systems Technology	....	....	....	....	....	....	4	2	6
Bachelor of Science	....	56	94	583	259	210	4	3	1,209
Total Baccalaureate Degrees	288	795	706	1,797	1,349	1,044	38	30	6,047
M.A. in National Security Affairs	....	....	....	....	....	23	33	37	93
M.S. in Aeronautical Engineering	....	....	....	40	115	224	50	38	467
M.S. in Applied Science	....	....	....	....	....	....	12	11	23
M.S. in Chemistry	....	....	16	5	32	16	....	....	69
M.S. in Computer Science	....	....	....	....	34	139	30	46	249
M.S. in Computer Systems Management	....	....	....	22	247	294	38	34	635
M.S. in Electrical Engineering	75	154	124	190	318	345	62	60	1,328
M.S. in Engineering Acoustics	....	....	....	....	13	37	11	6	67
M.S. in Management	....	....	....	406	633	964	137	142	2,282
M.S. in Material Science	....	....	....	5	9	....	....	....	14
M.S. in Mechanical Engineering	20	36	48	49	99	132	23	28	435
M.S. in Meteorology	23	19	40	53	53	126	7	13	334
M.S. in Oceanography	....	....	....	....	119	179	17	15	330
M.S. in Meteorology and Oceanography	....	....	....	....	....	....	4	11	15
M.S. in Operations Research	....	....	....	63	305	549	67	54	1,038
M.S. in Physics	....	25	104	135	124	102	16	11	517
M.S. in Systems Technology	....	....	....	....	....	19	26	19	64
M.S. in Telecommunications Systems Management	....	....	....	....	....	....	....	2	2
Master of Science	....	17	-65	102	56	25	1	1	267
Total Master's Degrees	118	251	397	1,070	2,157	3,174	534	528	8,229
Aeronautical Engineer	....	....	....	4	33	45	4	2	88
Electrical Engineer	....	....	....	....	40	64	9	7	120
Mechanical Engineer	....	....	....	....	6	25	5	11	47
Doctor of Philosophy	....	....	1	14	25	38	6	6	90
Doctor of Engineering	....	....	....	....	....	....	....	1	1
Total Degrees	406	1,046	1,104	2,885	3,610	4,390	596	585	14,622

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— NOTES —

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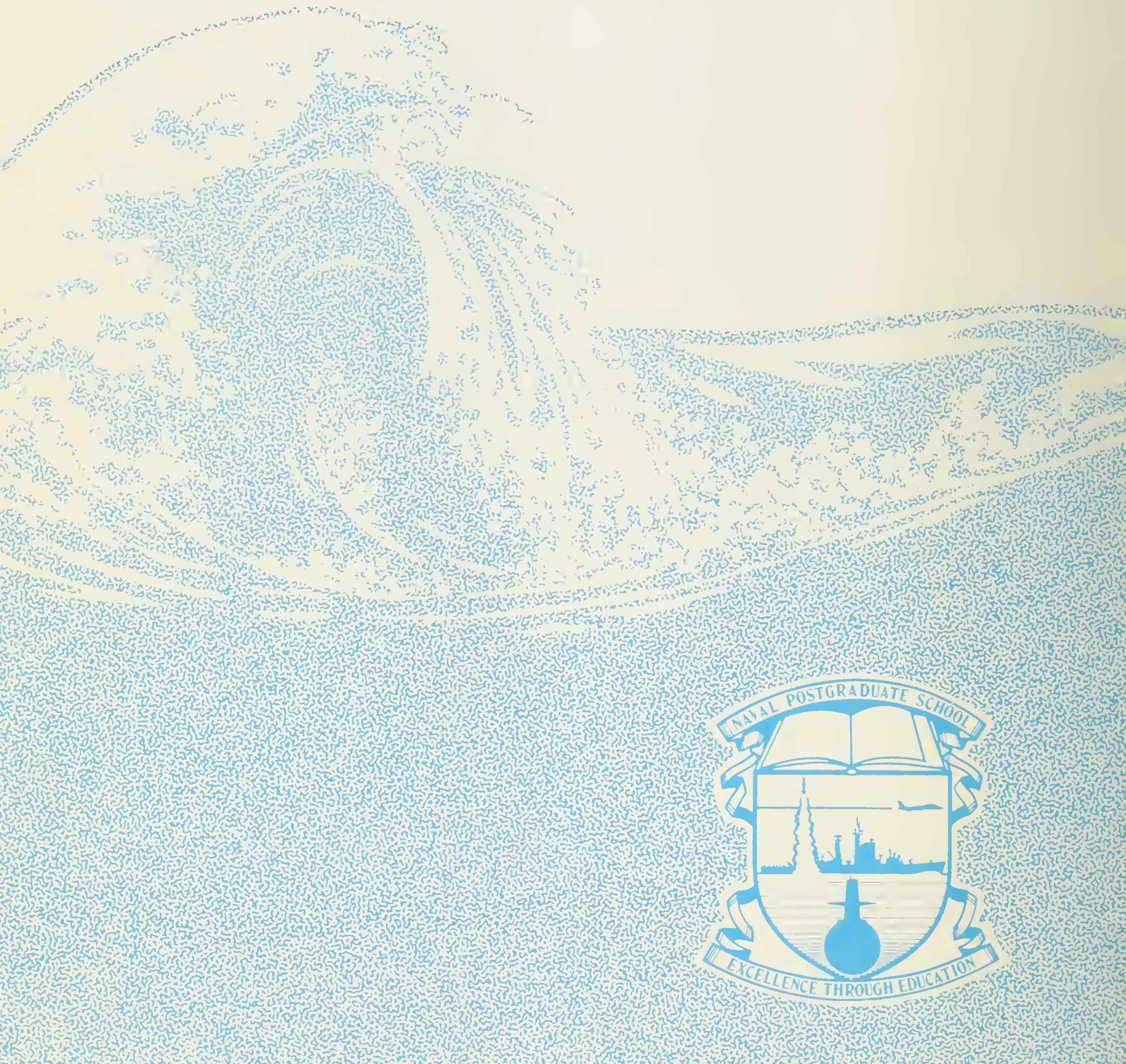

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